

Zero Retries issue 0201 2025-05-09

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fourth year of publication, with 2700+ subscribers.

About Zero Retries

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Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Craig Dale W9PAX** for becoming an **Annual Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

#

Zero Retries Digital Conference 2025 Update 2025-05-09

ZRDC Conference Manager Tina Stroh KD7WSF chided me (“*Honey, you forgot to mention...*”). In my previous ZRDC update, I neglected to mention that we now have an **Individual Amateur Radio Operator Sponsorship Letter** available on the ZRDC page:



ZRDC Individual Sponsor Letter

323KB · PDF file

[Download](#)

[Download](#)

Tina has also developed a **Corporate Sponsorship Letter**:



ZRDC Corporate Sponsor Packet

621KB · PDF file

[Download](#)

[Download](#)

For those that are interested in individually helping to sponsor ZRDC 2025, Tina and I would be grateful for financial help. We are in the process of composing similar letters for local Amateur Radio clubs and relevant companies and organizations.

The latest information on Zero Retries Digital Conference is at <https://www.zeroretries.org/p/conference> or click the **Conference** link at that the top of the Zero Retries page.

#

Hamvention 2025!

Preparation and packing are approaching fever pitch for my trek via planes and automobiles to Hamvention 2025 next weekend. My wonderful wife Tina has graced me with sane airline reservations of a direct flight from Seattle, Washington to Columbus, Ohio with reasonable car trips on both ends. Our airline of choice is Alaska Airlines, which in my experience is the last sane US airline and I have yet to have a bad Alaska flight (though obviously, Alaska has had its issues).

Which radio to bring is simplified down to bringing my venerable, reliable, easy to use Kenwood TH-F6A portable (analog FM only)... and nothing else. I don't have plans to be in communication with anyone via radio (absurd, I know, given the venue). Though given the use of Meshtastic at Hamvention (see ZR > BEACON article in this issue), a handheld (Blackberry style) Meshtastic unit might have been fun given the concentration of Meshtastic users at Hamvention. When I eventually purchase a [CS7000-M17](#), I'll certainly include that for big Amateur Radio events. With M17 being a primary topic at Zero Retries Digital Conference in September, I'll certainly have made that purchase this summer.

My tentative schedule for Hamvention follows. All seminars listed are interesting, but I may well not be able to attend all of them.

• Thursday 2025-05-15

- Attend Hamvention most of the day to meet and potentially interview Zero Retries Interesting vendors prior to general admission.
- After Hamvention closing, see the [VOA Museum](#) (extended hours through 21:00).
- Available in the evening for meetups in the Dayton area.
- Get my last good sleep for two days.

• Friday 2025-05-16

- Attend Hamvention all day.
- Seminars:
 - 09:15 - 10:15 - TAPR - Topics in Digital Radio - Forum Room 4
 - 12:50 - 14:00 - Strategy, Grantmaking, and 44Net: ARDC's Roadmap for the Future - Forum Room 3
 - 15:10 - 16:00 - APRS - State of the Union - Forum Room 3
- Most other times I will be at the MMDVM booth 2805, in the Tesla building discussing and demonstrating IP400.
- 18:30 - 21:00 - [TAPR / AMSAT Banquet](#) at Kohler Presidential Banquet Center. Mostly I'm attending to hear Phil Karn KA9Q talk about [ka9q-radio](#).

• Saturday 2025-05-17

- Attend Hamvention all day.

- Seminars:
 - 09:15 - 10:10 - HF Digital Modes - Forum Room 4
 - 12:40 - 13:40 - ARISS: Celebrating 25 Years of Continuous Operations on ISS... - Forum Room 2
 - 13:35 - 15:10 - AMSAT - Forum Room 2
- Available for dinner meetups for fun Zero Retries Interesting discussions.
- **Sunday 2025-05-18**
 - Attend Hamvention all day (ends at 13:00).
 - 09:15 - 10:20 - Seminar - ARRL FCC Update - Forum Room 2
 - Depart Hamvention mid-afternoon.

Of course, the most memorable parts of attending any conference are the *unexpected* meetings.

#

Nice IP400 Mention in Amateur Radio Weekly

Zero Retries 0200's article - IP400 Ichiban - The Big Reveal got a nice mention in [Amateur Radio Weekly Issue 380](#):

An initial production run of 25 IP400 Ichiban units, paired with Raspberry Pi Zero 2 Ws, with the latest software on a MicroSD card, are in production.

My thanks to ARW Editor Cale Mooth K4HCK for his ongoing editorial support of Zero Retries and the IP400 Network Project. With over 8,000+ email readers, such mentions in Amateur Radio Weekly greatly improve the exposure of Zero Retries and the IP400 Network Project.

#

Another Zero Retries Interesting and "M17 Interesting" Issue of Random Wire Review Newsletter

Editor Tom Salzer KJ7T has filled Issue 130 full-to-bursting of Zero Retries Interesting information on M17, including this wonderful news:

Standing up a new M17 reflector

I have set up a new M17 reflector for *M17 users in the Pacific Northwest, USA*. (With M17, users/clients generally connect through a reflector.) Reflector M17-PNW is built on a Vultr.com server in Seattle. DVREF has summary details at <https://dvref.com/mrefd/m17-pnw>.

KJ7T offered me a preview of this issue (he's more organized than I am, especially this week) and I innocently asked if Droidstar required an Android phone or tablet. He replied with the section:

DroidStar on other platforms

KJ7T is *good*!

#

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

I hope to see some of you Zero Retries readers at Hamvention 2025! Travel safe!

Steve N8GNJ

Leave a comment

Share



Amateur Radio Isn't Having All The (Radio) Fun

By Steve Stroh N8GNJ

Zero Retries Readers - This subject is new...ish to me, and I don't know where to look for relevant information. For example, I've heard references to other bands where a license isn't required (for certain power levels), but I've never recorded such information.

I think this subject is useful information for "radio clubs" or "wireless clubs" such as those at High Schools, STE(A)M programs, Makerspaces, etc. that aren't necessarily involved with Amateur Radio.

There are many, many other ways to have "radio fun" without requiring an Amateur Radio or GMRS license. Please let me know about those also.

So I'd like to eventually publish an update to this article after receiving more input. Please use the comments link at the end of the story to provide additional input on this topic.

In Zero Retries 0200, I made a subtle change in the "prelude" statement that I put in each issue of Zero Retries. Previously:

Zero Retries is an independent newsletter promoting technological innovation that is occurring in

Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology.

Now:

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology.

“... *in and adjacent to*...”.

In my (entirely self defined) mission for Zero Retries - trying to document, share, and encourage experimentation and self-education in radio technology by non-professionals, there is a lot of interesting and meaningful activity adjacent to Amateur Radio...

but isn't *Amateur Radio*.

Such activity is significant. “Just get your Ham license” is too simplistic a perspective to say . There are reasons that's not a realistic, or reasonable approach. Some examples:

- You need a low barrier to entry. Example: getting younger kids excited about radio technology at a week long summer camp.
- Use of encryption.
- It's too much hassle to try to get a group licensed as Amateur Radio Operators. Example: A STE(A)M club or Makerspace members to participate in a radio-related activity.
- You live in a rural area where the Amateur Radio club is... I'll just say “not receptive” to new Amateur Radio Operators, especially kids. This is a true story that was told to me.
- Some minor commercial entanglement that might get “flagged” as “pecuniary interest”. Example: Radio experimentation being sponsored by the local electronics store which sells the hardware being used.

Recently this is most notable in the use of LoRa and Meshtastic in the US 902-928 MHz band to build decentralized, off-grid mesh networks for peer-to-peer messaging.

Why does this *matter*? Because Amateur Radio isn't growing (as much as it could) from the addition of a lot of curious young (and not so young) techies. They develop some curiosity about radio technology, and they start looking around for interesting stuff they can experiment with. As an example, [Hackaday](#) regularly presents radio technology projects, hacks, and general informational articles. Fortunately, Hackaday does feature stories about Amateur Radio... but it discusses Amateur Radio as *one* option, *of many*, for experimentation with radio technology.

Thus I think that Amateur Radio is somewhat in denial that they're in the “prime position” to attract the radio experimenters... unless Amateur Radio really knows what “the competition” is. That competition is interesting activities relating to personal experimentation with radio technology that aren't occurring in Amateur Radio or don't require an Amateur Radio license. What follows is not a complete list, and the links provided aren't meant (or verified) to be authoritative (or up to date)... just to illustrate the suggestion.

Note to non-US readers - in the US, it's (almost entirely) legal to *receive* any signal in the electromagnetic spectrum. The best statement I've ever heard about this was from the late Bob “Coop” Cooper, one of the pioneers of receiving satellite television (that wasn't intended for use by individuals). Coop said something to the effect is “whatever I do with signals that fall into my own backyard is my business”.

In the US, it's a legal gray area to (attempt to) decrypt transmissions that are encrypted... though that doesn't stop a lot of people from attempting to do so.

It's also a legal gray area to divulge / publish what you've received, especially for some government transmissions. The existence of [Broadcastify](#) and other such “receiver sharing” services would argue that “divulgence” isn't a real issue.

Other national governments have different regulations about what is legal to receive, etc.

But the goal of everything listed below is to have fun with, and learn about radio technology.

Receive Only - Space:

- [SatNOGS](#) is a distributed network of ground station receivers for downloading data from experimental research satellites (typically built by a university) in low earth orbit.
- [TinyGS](#) is a distributed network of receivers similar to SatNOGS but for use with satellites that are transmitting LoRa modulation on unlicensed spectrum.
- Receive Amateur Radio data and voice transmissions from the International Space Station - [Amateur Radio on the International Space Station - ARISS](#).
- [Receive weather images](#) from US government weather monitoring satellites.
- Receive [Othernet](#) free data transmissions.
- Receive free satellite television broadcasts. There are some satellite television channels that are not encrypted.
- [Receive “interesting” transmissions](#) (video) from the US military’s FLTSATCOM / UFO satellites. With a tuned, directional antenna, signals can sometimes be heard with a reasonably priced software defined receiver because these satellites operate in the UHF rather than microwave bands.
- [“Precision time enthusiasts”](#) maintain their own high precision timebases, usually with inputs from Global Navigation Satellite Systems (GNSS) such as the US Global Positioning System (GPS).
- Try to receive [Amateur Radio Earth Moon Earth](#) transmissions. I did a thought experiment for this idea in a series of articles I called Neil’s Night (Zero Retries 0097 - Part 1, Zero Retries 0098 - Part 2, and Zero Retries 0099 - Part 3) to attempt this each July 20th evening, the anniversary of humanity setting foot on Earth’s moon, Luna.

Receive Only - Terrestrial:

- [Short Wave Listening](#) (HF bands). This is still an absorbing hobby for many.
- Listen to HF via online Software Defined Receivers including [WebSDR](#) and [KiwiSDR](#), or put your own Software Defined Receiver online.
- Receive WSPR signals and optionally gate data into [WSPRNet](#) and similar systems.
- Receive [marine weather charts](#) (Weather Fax) HF transmissions.
- Scanning (VHF / UHF bands) and optionally gating those signals into [Broadcastify](#) and other such aggregators.
- Experiment with [ka9q-radio](#), which is a novel “receive an entire band simultaneously” technology (not tuning or scanning). ka9q-radio can be used to receive multiple HF bands, or entire VHF / UHF bands, including all Amateur Radio repeaters in the 10m, 6m, 2m, 1.25m, 70cm, and 23cm bands.
- Receiving APRS transmissions and optionally [gating those into the APRS-IS infrastructure](#), including [aprs.fi](#). Monitoring very small research balloons is a particularly interesting use case of receiving APRS transmissions.
- Receiving [AIS](#) (marine) and [ADS-B](#) (aviation) location beacon transmissions and optionally gating those into network monitoring.
- Receive [NOAA Weather Radio All Hazards](#) radio. These are transmitter stations that broadcast continuously about weather conditions and have special provisions for alerting during emergency events.
- [Receiving digital video](#) (PDF) from an Amateur Radio Digital Television repeater.
- Receiving [Amateur Multicast Protocol \(flamp\)](#) file transmissions. These can be all manner of files - images, bulletins, documents, etc. and can be received by anyone with an appropriate (simple) receiver and the flamp.

software.

- General radio receiving experimentation [using inexpensive “RTL-SDR dongles”](#) and other Software Defined Receive units.
- Participation in [Ham Radio Science Citizen Investigation \(HamSCI\)](#) which despite “Ham” in the name, is not limited only to Amateur Radio Operators. There are many projects such as radio receivers and magnetometers where individuals with no Amateur Radio license can contribute to HamSCI’s mission.
- [Radio Direction Finding \(RDF\)](#), better known as “bunny hunting” or fox hunting”. This can either be done as a radiosport (very low power transmitter deliberately placed as an RDF exercise) or locating sources of malicious or accidental interference. The concepts are the same from hobbyist, through commercial, and become deadly serious in military conflicts. My favorite RDF device is the [KrakenSDR](#).
- It actually seems novel now, but receiving Over The Air (OTA) television broadcast signals can be interesting. Each television transmission can include as many as six individual video streams, and it’s sometimes interesting to see what is included.

Transmitting:

- [Microbroadcasting](#) using the AM and FM (voice) broadcast bands. You can experiment (carefully...) with transmitting very low power FM with a Raspberry Pi using [PiFM](#) or [Pi-FM-RDS](#).

Transmit and receive:

- Use of unlicensed bands such as 902-928 MHz, 2.4 GHz, 5.x / 6.x GHz.
- Use of unlicensed radio services such as Multiple Use Radio Service (MURS), Citizens Band (CB), Family Radio Service (FRS), Unlicensed Personal Communication Service (PCS). Note that [Ribbit / Rattlegram](#) implements data over any Push to Talk two way radio system with no physical connection to a radio device, and this model presages all kinds of experimentation possibilities.
- Use of “Licensed lite” radio services such as General Mobile Radio Service (GMRS).
- Open source development of [OpenWRT](#) replacement firmware for Wi-Fi Access Point units.
- Bluetooth is [not limited to short range](#) usage.
- Use of [LoRa](#) and [802.11ah / Wi-Fi HaLow](#) in unlicensed spectrum.
- Use of [Automatic Packet Reporting System \(APRS\) \(typically using LoRa\)](#) in unlicensed spectrum,
- Construction of wide area microwave networks using unlicensed 2.4, 5.x, and 6.x GHz. Such networks are not limited to use by commercial users including Wireless Internet Service Providers (WISPs).
- Experimentation with Software Defined Receiver / Transmitter units such as [ADALM-PLUTO](#) operating at very low power levels into inefficient antennas or dummy loads for “communications across a lab bench”

General experimentation with radio technology:

- Build a radio receiver kit (assemble components, practice soldering). [One example on Amazon](#).
- [GNU Radio](#) open source software development toolkit. [GNU Radio Companion](#) is a visual model (kind of a Graphical User Interface) for GNU Radio.
- [Reticulum](#) is a unique entity, essentially an “anything to anything” network router, capable of connecting to [nearly any radio system or any wired network](#).
- If you want to link geographically separated networks (example - mesh networks using 802.11ah / Wi-Fi HaLow) that aren’t in radio range of each other, you can experiment with connecting them via Internet. While

there are no options for blocks of the older IPv4 addresses for free, experimental use¹ (that I was able to find²), but free experimental use can be done with the newer IPv6 protocol. For example, [Hurricane Electric's Tunnel Broker](#) is a popular and free option that provides a /48 IPv6 block.

- Participation with a public safety entity, such as working with a Sheriff or Police department as an “auxiliary communicator” using their radios under their license. Not exactly experimentation, but at least familiarization with radio communications without requiring an Amateur Radio license.
- Involvement with recreational boating, thus you can use some Marine VHF frequencies and equipment for casual use (boat to boat, or boat to shore).
- Experimentation with commercial radio technology systems such as Push To Talk apps over IP / mobile carrier such [Zello](#), and experimentation with Starlink, especially [Starlink Mini](#). Note that Starlink units receive a reasonable number of (apparently, from brief research) [static IPv6 addresses](#).
- If you have something really novel in mind, and have a plan for development or testing of a novel system, an FCC [Special Temporary Authority \(STA\)](#) or [Part 5 Experimental License](#) is a possibility.
- Get involved in your local [Community Radio Station](#). A community radio station typically broadcasts in the FM band at low power, designed to serve the local community. Such stations are typically operated as a not-for-profit entity and usually staffed and managed by volunteers.

IP900

Lastly, while the [IP400 Network Project](#) is currently focused on Amateur Radio use in the Amateur Radio 420-450 MHz band, one element of the long term development plan is to consider developing a variant of IP400 using the same concept, protocols, etc. with different radio hardware, and power levels compatible with Part 15 (unlicensed) regulations for use in the 902-928 MHz band - **IP900?**

...

In conclusion, the point of listing all of the above options for experimenting with radio technology, *and especially having fun experimenting with radio technology*, that doesn't require an Amateur Radio license is to be easy (well, *easier*) ways to experiment with and learn about radio technology.

If you're content to experiment with the above... such as many do with Citizens Band, experimenting with data communications in the 902-928 MHz band, or building and operating not-for-profit microwave networks, great! You're learning about radio technology and having fun with radio technology!

Pro tip... once you start doing substantive³ experimentation with radio technology, talk about it on your LinkedIn page. Radio technology experience is a comparatively rare skill and you never know when a company needs more radio technology expertise.

I'll break my usual policy of not mentioning publications behind a paywall for mention in Zero Retries because this topic wouldn't be complete without a mention of a (electronic) magazine - [The Spectrum Monitor \(TSM\)](#). TSM's subscription and back issue fee are reasonable, and each issue is distributed as PDF rather than onerous Digital Rights Management (DRM).

If you want to take the next step in experimenting with radio technology - getting your Amateur Radio license, you'll then be able to transmit on many other radio bands, from Very Low Frequency (VLF) to Microwave (and beyond) at power levels up to 1,000 watts (yes, really)...

Amateur Radio is (literally) a license to experiment with and learn about radio technology.

Leave a comment

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New Types of New Amateur Radio Operators... and Their Expectations

By Steve Stroh N8GNJ

This article has been in the draft queue for some time and it seems appropriate to complete it as a companion to the previous article.

On the eve of Hamvention 2025, the largest (?) Amateur Radio conference in the world, I think it's an opportune moment to recognize that Amateur Radio, like all other organized activities, needs to constantly renew itself with new entrants. My perception from my research for Zero Retries is that this trend - more technical entrants, is not widely recognized, or perhaps is only just now beginning to be recognized. And, perhaps more importantly, what these new Amateur Radio Operators are expecting from, and contributing to Amateur Radio.

I've been noting for some time in Zero Retries that there is a new type of new Amateur Radio Operator coming into Amateur Radio that is generally more *technical* than "casually interested" or "focused on emergency communications" potential Amateur Radio Operators.

Backgrounds of these new, more technical entrants into Amateur Radio include software developers, involvement in the IT industry (and especially networking / Internet), involvement in the radio technology industry (including those working for mobile carriers), involvement in the space industry, scientists, open source advocates, technical and university engineering students (and teachers / professors), makers, and hackers. Three examples of what I'll call "NewTechHams" with prominent public profiles include:

- [Limor "Lady Ada" Fried](#) AC2SN, Founder of [Adafruit Industries](#)
- [Dale Dougherty](#) KN6WKW, cofounder of O'Reilly Media and publisher of [Make Magazine](#)
- [Jeff Geerling](#) KF0MYB popular [YouTube creator](#), open source advocate, and advocate of Raspberry Pi computers (and its ecosystem)

I first wrote substantively about this trend in **Zero Retries 0162** in New Meme - Hackers Are The Future of Ham Radio. The primary example of this trend is that Amateur Radio is a regular feature of the DEFCON conference, including Amateur Radio examinations. From the article:

It's instructive that the largest Volunteer Examiner (VE) Amateur Radio license testing session was at [DEFCON 22 in August 2014](#) (see pages 8 and 9). 205 hackers took their Amateur Radio test at DEFCON 22; the number that passed wasn't noted in the article.

Once I became aware of this trend, I began to see it in many other places. I talked to one newly licensed Amateur Radio Operator who said that they were an IT professional that deployed and managed Wi-Fi infrastructure for a major company. When they heard about [AREDN](#) networks, they obtained their Amateur Radio license so they could help deploy and manage AREDN networks.

Thus here are some general observations about NewTechHams.

Transactional

NewTechHams approach Amateur Radio as a transactional activity rather than a hobby (pastime) activity. They have specific expectations of what they want to do, what they want from Amateur Radio. Example: Many want to get hands-on experience with more advanced radio technology than using only unlicensed radio devices such as Bluetooth, Wi-Fi, and LoRa.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, there has to be widespread support for the kinds of technologies and activities that relevant to NewTechHams. Examples: Zero Retries and [Random Wire](#) newsletters, [Tech Minds](#) YouTube channel, Zero Retries Digital Conference, [M17 Project](#), [AREDN](#), [IP400 Network Project](#), and supporting organizations.

Software and Open Source is Primary

With the rise, and now *dominance* of Linux in the Information Technology and Internet industries, software has become the primary technology to create new systems. Adequately powerful processors that enable the use of high level programming languages is now assumed. There's a lot less use of "write to the metal" programming, even when

using microcontrollers because it's simply more productive to do so.

This trend is no different in Amateur Radio. For example, the new < \$200 [zBitx HF radio](#) uses a Raspberry Pi Zero 2 W computer for most of its functionality, running Linux. The zBitx is (claimed to be) open source, thus experimentation by the end user is possible, and an [active group of experimenters](#) is doing so.

Linux has now been in use for more than three decades. Thus NewTechHams have grown up with Linux and open source, and many NewTechHams *really, actively despise* proprietary systems in Amateur Radio such as the use of the proprietary DVSI codec technology used in DMR, D-Star, System Fusion, and P25. When considering involvement in a project, their first and highest priority question is “*where's the GitHub repository*”?

Conversely, a number of NewTechHams have embraced the M17 Project because it's completely open source. On the m17-users list, I was told that prior to becoming aware that M17 was open source, a number of technically proficient Amateur Radio Operators completely ignored digital voice technology because it required the use of proprietary technology.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, there has to be support for participation in Amateur Radio projects and systems and activities via software and the open source model of community software development.

Internet Native; Internet is Just Another Utility

Similarly to Linux, NewTechHams have grown up with ubiquitous Internet access. NewTechHams under 30 have never known a world without Internet Access. We've had mobile broadband Internet access for nearly two decades now.

Thus NewTechHams tend to treat Internet as just another utility. *Why wouldn't* their Amateur Radio activities not incorporate Internet when doing so adds to the interest and utility and learning about radio technology and Amateur Radio. For example, the [Random Wire](#) newsletter does a stellar job of covering the various (and varied!) aspects of Amateur Radio over Internet. Another example is the rapidly rising popularity of remotely accessible HF radio systems, especially when offered as a membership amenity of Amateur Radio clubs. Such an option is very attractive for exploring HF by those that can't afford or build their own HF station (students, those in apartments, etc.)

One interesting aspect of NewTechHams expecting always-available Broadband Internet Access (both “landline” and mobile) is that they are acutely sensitive to Internet failure. Thus they seek Internet backup options such as [Starlink](#) and alternatives to Internet access, such as [Meshtastic](#), [General Mobile Radio Service \(GMRS\)](#), and [Ribbit](#) for critical communications when Internet isn't available.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, Amateur Radio over Internet activities need to be much more widely known and evangelized within Amateur Radio to attract and interest the Internet native NewTechHams. Specifically, it needs to be widely understood that the pervasive “*that... isn't Ham Radio*” attitude *be retired*.

Currently, emergency communications in Amateur Radio is primarily promoted for involvement with “served agencies”. While some NewTechHams might be interested in such activity, as explained above, it's likely of much more interest to NewTechHams that Amateur Radio can be used as a backup for *personal communications*. Example - promote AREDN, use of VHF / UHF repeaters, and easy to use HF radios.

Data Primary, Voice if Necessary

NewTechHams generally prefer text communications because it's simply more efficient than communicating via voice. There's a record, typing is second nature to them, and they use text messaging systems in their jobs (example - Slack), in their personal communications (example - Signal), and in their recreation (example - Discord). Thus they have a similar perspective in their consideration of Amateur Radio... “I don't want to *talk*, I want to *text*”.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, text messaging and data communication modes need to be promoted and be widely available. Examples - [DigiPi](#) (multiple data modes), IP400 Network Project, and Winlink (especially using apps such as RadioMail).

More Interested in VHF / UHF than HF

This is the most subjective aspect of this article, but my observation is that NewTechHams are generally more interested in experimenting and operating on VHF / UHF, mostly because the equipment is less expensive (such as portable VHF / UHF radios versus HF radios) and especially because the overall requirement for larger, outdoor antennas for HF is problematic (living in apartments, rental homes, and homeowner's association restrictions). But this is rapidly changing due to:

- More powerful, reliable data modes in use on HF such as [JS8Call](#),
- More inexpensive options of Software Defined HF radios such as [zBitx](#), and
- New types of low profile (stealthy) HF antennas such as [Magnetic Loop Antennas](#).

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, these factors have to be considered in recruiting NewTechHams such as offering good VHF / UHF options such as powerful, sensitive VHF / UHF repeaters, or careful recommendations of starter HF modes, radios, and antennas rather than “just buy a used HF rig at a hamfest”.

Mistaken and Managed Expectations

For the past two decades, NewTechHams have been using mobile devices over cellular networks that provide voice and Broadband Internet Access. That these mobile devices over cellular work so well is a function of uncountable billions of dollars in collective infrastructure development (multiple generations of technology) and incredible advances in computational and resulting computational-based radio technology.

Thus NewTechHams sometimes don't understand why, when attempting to use a VHF / UHF repeater via a small portable FM radio, it doesn't work as well as a mobile device. It *looks* like a (simplified) mobile device. Adding to that confusion are [Push To Talk over Cellular devices](#) that look very similar to small portable FM radios.

Thus the experience of a NewTechHam attempting to use a small, portable FM radio via a VHF / UHF repeater is far less than impressive than their experiences using a mobile device over cellular.

Using Amateur Radio data communications systems is similarly “less than impressive”, especially legacy 1200 bps AFSK. Even VARA FM which can achieve up to 25 kbps using modems with “voice” radios isn't very impressive to NewTechHams.

One of the reasons that I feel that 2025 is an opportune moment to develop and promote the IP400 Network Project is that expectations for independent mesh networked data / messaging systems is that Meshtastic has set (low) expectations, and IP400 can easily exceed those expectations. Thus IP400 can provide an incentive to become involved in Amateur Radio, because IP400 (will, eventually) work better than Meshtastic.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, Amateur Radio needs to be able to offer relevant voice and data systems, and where necessary, offer information and manage expectations.

Example messaging:

This (photo) is a handheld device using cellular networks. It works well because there's billions of dollars invested in development of the technology and deployment of the networks.

This (photo) is a handheld device using Amateur Radio. It uses a radically simpler technology - VHF / UHF repeaters, with a few thousand dollars invested in maintaining each repeater.

That's why when the cellular device (rarely) fails, the handheld device using Amateur Radio still works, *because* it's simpler, decentralized, and independent of cellular networks.

IP400 - Everything you love about Meshtastic⁴ such as off-grid mesh networking, but much faster and much more reliable using Amateur Radio.

Walled Gardens and Paywalls Versus Open Access

Given their experience with open source and being Internet natives, NewTechHams generally prefer to self-educate when learning about something new like Amateur Radio. Thus, they look for what they can find on the Internet, especially video and other short, easily readable text such as Wikipedia.

What NewTechHams generally do when trying to learn about something new is see what they can find on their own (independent learning) on the Internet, such as YouTube or TikTok, publications such as [The Communicator](#) and [Amateur Radio Weekly](#), Wikipedia articles, the [Digital Library of Amateur Radio & Communications \(DLARC\)](#) project of the Internet Archive, and most recently using Artificial Intelligence (AI) systems to ask questions such as “What is Ham Radio?”

What’s common to all of those independent learning sources is that they are all open media. That is, not hidden behind a paywall, accessible only to “paying customers”. Many, perhaps most current Amateur Radio Operators consider it “normal” to join an organization such as a local club, technical club, or national organization to access paywalled material such as the club newsletter, AMSAT Journal, or QST. But that’s just not the typical perspective of NewTechHams. Thus such content isn’t an “incentive” to join and financially support those organizations. That content is effectively invisible from independent learning, thus nearly irrelevant to NewTechHams.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, good instructional material must be made available at no cost, and publicly available via Internet. While the examples cited above are good references for individual subjects, there needs to be a more comprehensive treatment of Amateur Radio as a whole such as an open source equivalent to the ARRL Amateur Radio Handbook, perhaps titled “Amateur Radio Open Source Omnibus” with elements from open source material such as [73 Magazine](#) in DLARC.

Software First, Hardware Second, and Cheaper Is Better

As explained earlier, NewTechHams generally prefer software based systems that can be experimented with and changed versus “fixed” hardware. For example, the [TIDRADIO H3](#) portable radio has an active community developing alternative firmware versions for it. The [Yaesu FT-4XR](#) portable radio is a capable unit from a major Amateur Radio manufacturer, but its functionality is fixed. Thus, to NewTechHams, the H3 is generally preferably to the FT-4XR.

Another factor to take into consideration with NewTechHams is that they didn’t grow up with as much hands-on experience with electronics such as assembling [Heathkit units](#) with soldering irons. NewTechHams generally experimented with electronics units such as [breadboards](#) and [Arduino](#) and assembling their own custom personal computer from modules such as motherboards and disk drives. Thus the usual advice for Amateur Radio experimentation of “Just solder together...” or “Make a cable...” can be a “showstopper” for less experienced NewTechHams.

Frugality... is the *one area where there is almost total overlap* between NewTechHams and traditional Amateur Radio. Both groups are cheap. NewTechHams grew up with powerful digital technology being available for low prices, especially considering mail order from China... prior 2025, anyway. Older Amateur Radio Operators learned how to economize in their Amateur Radio stations such as modifications published in a magazine, making their own cables instead of buying prefabricated cables, etc.

Thus... if Amateur Radio wants to retain (and grow) NewTechHams in Amateur Radio, there needs to be emphasis on “software hackable” technology, minimal hardware tinkering required (especially minimizing soldering), and there needs to be many inexpensive alternatives available at the entry level. For example, the [DigiPi](#) project addresses all three of these areas:

- DigiPi is open source and thus software hackable.
- DigiPi can be assembled easily from widely available hardware such as [N7EBB’s Radio Interface Board](#) or the [Masters Communications DRA-Pi-Zero](#) REV2, both of which are available in either as a kit to be assembled, or fully assembled.
- DigiPi can be assembled inexpensively depending on options you choose.
- DigiPi is also very well supported by the developer with videos and responsiveness on a email list.

In conclusion, I think NewTechHams offer a needed “shot in the arm” to Amateur Radio just at the right time as the

opportunities for innovation and experimentation in Amateur Radio have never been more widely available due to new, more widely available, and inexpensive radio technology.

But to attract NewTechHams into deeper involvement with Amateur Radio, their unique characteristics need to be recognized, accommodated, and most importantly utilized. Just one final example - if a radio club wants to find and promote new younger members, they need look no further than the local Makerspace or high school STE(A)M program. But the club needs to be prepared for those potential new Amateur Radio Operators and club members to “think different” than “traditional” Amateur Radio, as in meeting them where they are (digital, text, software) rather than “we need to get you licensed and then you’ll be able to have fun on HF”.

Leave a comment

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

[SDR++ with Digital Speech Decoder \(Florida Man Edition!\)](#)

Craig Lamparter KM6LYW via Patreon:

Let's use a cheap Software Defined Radio (SDR) to listen in on Digital voice signals. Yaesu Fusion, DMR, DSTAR and P25 are easy to listen to with SDR++ and the Digital Speech Decoder "Florida Man Edition"! A ham radio license is NOT required to listen to digital voice. Listen in on emergency services, local businesses, and ham radio. You get reasonable high quality audio with no hiss or static. The business band conversations are particularly interesting since they assume nobody can hear them :).

This video is, in my opinion, a fantastic example of having fun with radio technology. If you aren't familiar with digital voice modes, this is a good primer and example fun project. Kudos to KM6LYW for this one!

###

[Are Multi-Carrier Data Modes Illegal in Amateur Radio?](#)

Michelle Thompson W5NYV on the Open Research Institute website and blog:

Mike McGinty raises a legitimate question about the interpretation of Part 97 rules regarding emission types and digital codes, particularly for multi-carrier data modes like LTE. The core of the issue appears to be in two parts of 47 CFR Part 97...

The entire article is worth a thorough... but not too thorough read (don't twist yourself in mental knots trying to follow every nuance). I speak from experience trying to fully parse particular Part 97 sections, following the footnotes, etc. For me, doing so is headache-inducing.

One's answer to the question in the title largely depends on whether one prefers, in Amateur Radio, to “Ask for forgiveness?” or “Ask for permission?”

For the former perspective, the answer is no. There's reasonable latitude in Part 97 for experimentation, most notably:

The provision in §97.309(a)(4) indicates that “An amateur station transmitting a RTTY or data emission using a digital code specified in this paragraph may use any technique whose technical characteristics have been documented publicly”

Assuming, of course, in their experimentation, one does actually “**document publicly**”.

In my, and Zero Retries' advocacy of experimentation in Amateur Radio, I very much advocate the “ask for

forgiveness” perspective. And of course, documenting publicly. One excellent example of “documented publicly” is ~~Interleaved~~ [Improved Layer 2 Protocol \(IL2P\)](#) Forward Error Correction (FEC) protocol now available as an option in the [NinoTNC](#), [Dire Wolf Software TNC](#), and [MMDVM-TNC](#).

One Zero Retries commenter described Part 97 as “a maze of twisty passages” which I think nicely captures the absurdity of Amateur Radio regulations that, *over nearly a century* have accreted, been revised, adapted, and in some cases “transmogrified” into the current version of Part 97. In the era of “writing a new radio” using Software Defined Radio technology, Part 97 is nearly incomprehensible and borderline absurd. *Fixing it... ay, there's the rub.*

#

[Langstone \(V2\) VHF / UHF Software Defined Radio Project](#)

Zero Retries reader David Gleason NR9V via email:

Thought I'd share a video on a cool SDR project - Langstone - which seems to have great potential and that could be a good starting point for a Superpeater SDR platform. They have already integrated my UCI120. Once a few more details are worked out I'll likely look into doing a product that integrates all needed RF filters, switches, a small PA, and maybe some of the UI buttons & knobs.

NR9V builds amazing gadgets in his company [Allscan](#).

NR9V is correct that this project is very Zero Retries Interesting - a great combination of Software Defined Radio plus VHF and UHF power amplifiers so the SDR modes can be actually used on VHF / UHF to communicate with others. Different from the unit used in the video, Langstone V2 incorporates additional options for the SDR including Lime SDR Mini and Lime SDR Mini V2, which have wider frequency coverage than the ADALM PLUTO used in the video.

So... many Zero Retries Interesting projects, so little time of late. But that's a fun problem to have too many wonderful options, rather than too few.

#

[Meshtastic Publishes Special Firmware for Hamvention 2025](#)

Amateur Radio Daily:

The [Meshtastic](#) project has released a special firmware build for users that are attending [Hamvention](#). The dedicated firmware is designed to reduce confusion and instability experienced by users attending Hamvention in 2024.

The event firmware includes hardcoded sensible defaults to help ensure mesh stability in the dense environments we see at events like Hamvention. These include:  Blocks non-standard port numbers  Disables public MQTT  Caps hop limit at 3  Forces conservative telemetry/nodeinfo intervals

Additionally, Dayton Hamvention firmware is configured with: Preset: Short_Turbo (20x bandwidth of LongFast) Channel 31 — 917.25 MHz 3 default channels: • Hamvention • NodeChat • YardSale

The special Hamvention Meshtastic firmware can be downloaded and installed from the [Meshtastic website](#).

Now *that...* is Zero Retries Interesting. Good thinking on Meshtastic's part and I'm going to have to find a friend that has a Meshtastic device at Hamvention and see how much fun there is to be had with Meshtastic in a dense user environment. Most of what I read is "my node is up... where is everybody?"

###

[AREDN Production Release 3.25.5.0](#)

AREDN website / blog:

Major Enhancements:

- Babel Routing
- Deprecating Tiny Firmware Nodes
- Migrate Legacy Tunnels
- PtP and PtMP RF modes

Full details are in the link. Babel routing is now AREDN's *primary* mesh routing protocol, and (by my reading) the next Production Release will make Babel the only mesh routing protocol... and the migration is going great.

Kudos to the AREDN team for all this amazing work!

Leave a comment

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Comments Summary From Previous Issue

Administrivia: I have recently begun closing comments after commenting wanes. *Comment early, comment often!*



...

Comments from Zero Retries 0200:

- Mention of Lynovation tuning knobs for use with Software Defined Radios.

- Congrats on 200+ issues of Zero Retries
 - Discussion of GMRS repeater linking (disallowed by current FCC regulations).
-

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Zero Retries Boilerplate

The [Zero Retries Store](#) is now open for business with quality Zero Retries branded merchandise and items being retired from Steve's N8GNJ Labs.

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

See the **Zero Retries Boilerplate** page for significant acknowledgements and other information relevant to Zero Retries. For new readers of Zero Retries, that page, and the **About Zero Retries** page has useful information to check out.

My ongoing *Thanks* to:

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Jack Stroh, Late Night Assistant Editor Emeritus

Shrek Stroh, Late Night Assistant Editor In training

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Footnotes for this Issue

To see the relevant sentence for the footnote, just click the footnote number.

[1](#)

Use of ARDC's 44Net IPv4 addresses require an Amateur Radio license, thus out scope for this article.

[2](#)

Sometimes arrangements can be made with, for example, educational institutions for use of publicly routable IPv4 addresses or blocks.

[3](#)

LinkedIn: "I got my RTL-SDR dongle working"... probably best not to list that. But "Helped put up a new node in a wide area microwave network!" - *definitely* mention that!

[4](#)

Assumes that there will be a handheld device app similar to the [Meshtastic app](#) such as a version of [RadioMail](#) for use with IP400.